CLAIMS

What is claimed is:

1. In a computing environment, a method to generate a fillet weld bead to be used to weld a plurality of components of an article of manufacture together at one or more faces of the components in the manufacturing of the article outside the computing environment, the method comprising:

examining within the computing environment, facial characteristics of the faces of the components;

selecting within the computing environment, a generation technique based at least in part on the result of said examining; and

applying within the computing environment, the selected generation technique to generate a data representation of the fillet weld bead.

2. The method of claim 1, wherein said examining comprises examining within the computing environment, one of the faces to determine at least one of whether the face is planar and whether the face is cylindrical.

3. The method of claim 1, wherein said examining comprises examining within the computing environment, the faces of one component to determine whether the faces lie in a single plane.

4. The method of claim 1, wherein said examining comprises examining within the computing environment, a first face of a first component and a corresponding second face of a second component to determine whether the first and second faces are perpendicular.

5. The method of claim 1, wherein the selecting and applying comprise selecting and applying within the computing environment, a generation technique that includes construction of a triangular profile.

6. The method of claim 1, wherein the selecting and applying comprise selecting and applying within the computing environment, a generation technique that includes construction of a quadrilateral profile.

7. The method of claim 1, wherein the applying comprises assigning within the computing environment, one or more attributes to the faces, including at least one of

tracking attributes specifying the one or more attributes are to be propagated during each of a split, copy and merge operation performed within the computing environment on data representations of the faces, and

ownership attributes specifying ownership of the fillet weld bead by the faces.

8. The method of claim 1, wherein the applying comprises generating within the computing environment, a blank, based at least in part on bodies referred to by the faces.

9. The method of claim 1, wherein the applying comprises generating within the computing environment, one or more paths, based at least in part on edges of a blank.

10. The method of claim 1, wherein said applying comprises generating with the computing environment, a tool, based at least in part on a profile.

11. The method of claim 1, wherein said applying comprises constructing within the computing environment, a trimmer body, and applying within the computing environment, a non-regularized boolean operation between the trimmer body and a tool.

12. In a computing environment, a method of operation comprising:

constructing within the computing environment, a profile based at least in part on faces of components of an article of a manufacture to be fillet welded together at the faces;

generating within the computing environment, a tool based at least in part on the constructed profile; and

conditionally trimming within the computing environment, the tool, with a data representation of the untrimmed tool to be initialized as a data representation of a fillet weld bead to be used to weld the components together at the faces if, trimming is not performed, and a data representation of the trimmed tool to be initialized as a data representation of a fillet weld bead to be used to weld the components together at the faces, if, trimming was performed.

13. The method of claim 12, wherein the constructing comprises constructing within the computing environment, a triangular profile.

14. The method of claim 12, wherein the constructing comprises constructing within the computing environment, a quadrilateral profile.

15. The method of claim 12, wherein the method further comprises assigning within the computing environment, one or more attributes to the faces, including tracking attributes specifying at least attributes of the faces are to be propagated during each of a split, copy and merge operation

performed within the computing environment on data representations of the faces.

16. The method of claim 12, wherein the method further comprises assigning within the computing environment, one or more attributes to the faces, including ownership attributes specifying ownership of the fillet weld by the faces.

17. The method of claim 12, wherein the method further comprises assigning within the computing environment, one or more attributes to other faces of the components specifying faces of the fillet weld bead are not to overlap with these other faces of the components.

18. The method of claim 12, wherein the method further comprises generating within the computing environment, a blank, based at least in part on bodies referred to by the faces.

19. The method of claim 18, wherein the generating of a blank comprises

locating within the computing environment, one or more bodies referred to by the faces;

replicating within the computing environment, data representations of the located one or more bodies;

conditionally forming within the computing environment, a unified body, if, data representations of more than one body are replicated; and

initializing within the computing environment, a data representation of a located body as a data representation of the blank if, only one body was located, and initializing within the computing environment, a data representation of the unified body as a data representation of the blank if, the conditional forming operation was performed.

20. The method of claim 12, wherein the method further comprises generating within the computing environment, one or more paths, based at least in part on edges of a blank.

21. The method of claim 20, wherein the generating of one or more paths comprises

collecting within the computing environment, one or more edges of a blank;

replicating within the computing environment, data representations of the located one or more edges;

conditionally forming within the computing environment, a wire body if, data representations of more than one edge are replicated; and

initializing within the computing environment, a data representation of a located edge as a data representation of a path if, only one edge of a blank was located, and initializing within the computing environment, data representations of disjoint pieces of the wire body as data representations of one or more paths if, the conditional forming operation was performed.

22. The method of claim 12, wherein the generating comprises sweeping the constructed profile within the computing environment to generate the tool.

23. The method of claim 12, wherein said conditional trimming comprises constructing within the computing environment, a trimmer body, and applying within the computing environment, a non-regularized boolean operation between the trimmer body and the tool.

24. The method of claim 23, wherein the constructing of a trimmer body comprises determining within the computing environment, whether a path is open or closed.

25. The method of claim 24, wherein the method further comprises on determining the path is open,

determining within the computing environment, a start and an end point of the path;

determining within the computing environment, a first and a second point on a blank corresponding to the start and end points of the path;

determining within the computing environment, faces of the blank that are incident on the first and second points;

selecting within the computing environment, valid ones of said faces;

copying and extending within the computing environment, the selected valid ones of said faces into bodies; and

uniting within the computing environment, said bodies, to form the trimmer body.

26. The method of claim 12, wherein the method further comprises initializing within the computing environment, a data representation of the tool as a data representation of the fillet weld bead if, trimming is not performed.

27. The method of claim 12, wherein said conditional trimming comprises performing within the computing environment,

transfer of attributes from edges of the profile to lateral faces of the tool;

selective boolean operation on the tool and a trimmer body; and

initialization of the result of the selective boolean operation as a data representation of the fillet weld bead.

28. The method of claim 12, wherein said conditional trimming comprises performing within the computing environment,

transfer of attributes from edges of the profile to lateral faces of the tool;

subtraction of a blank, created based at least in part on bodies referred to by the faces, from the tool;

selective boolean operation on the result of the subtraction and a trimmer body; and

initialization of the result of the selective boolean operation as a data representation of the fillet weld bead.

29. In a computing environment, a method of operation comprises

locating within the computing environment, one or more bodies referred to by a plurality of faces of a plurality of components of an article of manufacture where the components are to be fillet welded together at the faces when the article is manufactured outside the computing environment;

replicating within the computing environment, data representations of the located one or more bodies;

conditionally forming within the computing environment, a unified body, if, data representations of more than one body are replicated; and

initializing within the computing environment, a data representation of a located body as a data representation of the blank if, only one body was located, and initializing within the computing environment, a data representation of the unified body as a data representation of the blank if, the conditional forming operation was performed, where the data representation of the initialized blank is to be used in generating a data representation of a fillet weld bead of the fillet welding operation.

30. The method of claim 29, wherein the method further comprises

collecting within the computing environment, one or more edges of the blank;

replicating within the computing environment, data representations of the located one or more edges;

conditionally forming within the computing environment, a wire body, if, data representations of more than one edge are replicated; and

initializing within the computing environment, a data representation of a located edge as a data representation of a path if, only one edge of a blank was located, and initializing within the computing environment, data representations of disjoint pieces of the wire body as data representations of one or more paths if, the conditional forming operation was performed, where the data representation of the path is to be used in the generation of the data representation of the fillet weld bead.

31. In a computing environment, a method of operation comprising:

collecting within the computing environment, one or more edges of a blank generated based at least in part on a plurality of faces of a plurality of components of an article of manufacture where the components are to be fillet welded together at the faces when the article is manufactured outside the computing environment;

replicating within the computing environment, data representations of the located one or more edges;

conditionally forming within the computing environment, a wire body, if, data representations of more than one edge are replicated; and

initializing within the computing environment, a data representation of a located edge as a data representation of a path if, only one edge of a blank was located, and initializing within the computing environment, data representations of disjoint pieces of the wire body as data representations of one or more paths if, the conditional forming operation was performed, where the path is used to generate a data representation of a fillet weld bead of the fillet welding operation.

32. The method of claim 31, wherein the method further comprises determining within the computing environment whether the path is open, and if the path is determined to be open, further

determining within the computing environment, a start and an end point of the path;

determining within the computing environment, a first and a second point on a blank corresponding to the start and end points of the path;

determining within the computing environment, faces of the blank that are incident on the first and second points;

selecting within the computing environment, valid ones of said faces;

copying and extending within the computing environment, the selected valid ones of said faces into bodies; and

uniting within the computing environment, said bodies, to form a trimmer body, where the trimmer body is used for the generation of the data representation of the fillet weld bead.

33. In a computing environment, a method of operation comprises

determining within the computing environment whether a path is open, where the path is generated based on a blank that is generated based on a plurality of faces of a plurality of components of an article of manufacture, the components to be fillet welded together at the faces when the article is manufactured outside the computing environment; and

if the path is determined to be open, further

determining within the computing environment, a start and an end point of the path;

determining within the computing environment, a first and a second point on a blank corresponding to the start and end points of the path,

determining within the computing environment, faces of the blank that are incident on the first and second points,

selecting within the computing environment, valid ones of said faces,

copying and extending within the computing environment, the selected valid ones of said faces into bodies, and

uniting within the computing environment, said bodies, to form a trimmer body, where the trimmer body is used for generating a data representation of a fillet weld bead of the fillet welding operation.

34. The method of claim 33, wherein the method further comprises

transferring within the computing environment, attributes from edges of a profile to lateral faces of a tool;

performing a selective boolean operation on the tool and the trimmer body; and

initializing the result of the selective boolean operation as a data representation of the fillet weld bead.

35. The method of claim 33, wherein the method further comprises

transferring attributes from edges of the profile to lateral faces of the tool;

subtracting a blank, created based at least in part on bodies referred to by the faces, from tool;

performing a selective boolean operation on the result of the subtraction and a trimmer body; and

initializing the result of the selective boolean operation as a data representation of the fillet weld bead.

36. An apparatus comprising:

storage medium having stored therein a plurality of programming instructions designed to enable the apparatus to

examine facial characteristics of a plurality of faces of a plurality of components of an article of manufacture where the components are to be fillet welded together at the faces when the article is manufactured outside the apparatus;

select a generation technique based at least in part on the result of said examine, and

apply the selected generation technique to generate a data representation of a fillet weld bead of the fillet welding operation; and

at least one processor coupled to the storage medium to execute the programming instructions.

37. The apparatus of claim 36, wherein the programming instructions are further designed to enable the apparatus to perform said examine by examining one of the faces to determine at least one of whether the face is planar and whether the face is cylindrical.

38. The apparatus of claim 36, wherein the programming instructions are further designed to enable the apparatus to perform, as part of said examining, examination of the faces of one component to determine whether the faces lie in a single plane.

39. The apparatus of claim 36, wherein the programming instructions are further designed to enable the apparatus to perform, as part of said examining, examination of a first face of a first component and a

corresponding second face of a second component to determine whether the two first and second faces are perpendicular.

40. The apparatus of claim 36, wherein the programming instructions are further designed to enable the apparatus to perform the selecting and applying by selecting and applying a generation technique that includes construction of a triangular profile.

41. The apparatus of claim 36, wherein the programming instructions are further designed to enable the apparatus to perform the selecting and applying by selecting and applying a generation technique that includes construction of a quadrilateral profile.

42. An apparatus comprising:

storage medium having stored therein a plurality of programming instructions designed to enable the apparatus to

construct a profile based at least in part on faces of components of an article of a manufacture to be fillet welded together at the faces,

generate a tool based at least in part on the constructed profile, and

conditionally trim the tool, with a data representation of the untrimmed tool to be initialized as a data representation of a fillet weld bead to be used to weld the components together at the faces, if trimming is not performed, and a data representation of the trimmed tool to be initialized as a data representation of a fillet weld bead to be used to weld the component together at the faces, if trimming was performed; and

at least one processor coupled to the storage medium to execute the programming instructions.

43. The apparatus of claim 42, wherein the programming instructions are further designed to perform the constructing by constructing a triangular profile.

44. The apparatus of claim 42, wherein the programming instructions are further designed to perform the constructing by constructing a quadrilateral profile.

45. The apparatus of claim 42, wherein the programming instructions are further designed to enable the apparatus to

locate one or more bodies referred to by the faces,

replicate data representations of the located one or more bodies,

conditionally form a unified body, if, data representations of more than one body are replicated, and

initialize a data representation of a located body as a data representation of the blank if, only one body was located, and

initialize a data representation of the unified body as a data representation of the blank if, the conditional forming operation was performed, where the data representation of the initialized blank is to be used in generating a data representation of a fillet weld bead of the fillet welding operation.

46. An apparatus comprising

storage medium having stored therein a plurality of programming instructions designed to enable the apparatus to

locate one or more bodies referred to by a plurality of faces of a plurality of components of an article of manufacture where the components are to be fillet welded together at the faces when the article is manufactured outside the apparatus,

replicate data representations of the located one or more bodies;

conditionally form within the computing environment, a unified body, if data representations of more than one body are replicated, and

initialize a data representation of a located body as a data representation of the blank if, only one body was located, and initialize a data representation of the unified body as a data representation of the blank if, the conditional forming operation was performed, where the data representation of the initialized blank is to be used in generating a data representation of a fillet weld bead of the fillet welding; and

at least one processor coupled to the storage medium to execute the programming instructions.

47. The apparatus of claim 46, wherein the programming instructions are further designed to enable the apparatus to

collect one or more edges of the blank;

replicate data representations of the located one or more edges;

conditionally form a wire body, if, data representations of more than one edge are replicated; and

initialize a data representation of a located edge as a data representation of a path if, only one edge of a blank was located, and initialize data representations of disjoint pieces of the wire body as data representations of one or more paths if, the conditional forming operation was performed, where the data representation of the path is to be used in the generation of the data representation of the fillet weld bead.

48. An apparatus comprising:

storage medium having stored therein a plurality of programming instructions designed to enable the apparatus to

collect one or more edges of a blank generated based at least in part on a plurality of faces of a plurality of components of an article of manufacture where the components are to be fillet welded together at the faces when the article is manufactured outside the computing environment;

replicate data representations of the located one or more edges;

conditionally form a wire body, if, data representations of more than one edge are replicated, and

initialize a data representation of a located edge as a data representation of a path if, only one edge of a blank was located, and initialize data representations of disjoint pieces of the wire body as data representations of one or more paths if, the conditional forming operation was performed, where the path is used to generating a data representation of a fillet weld bead of the fillet welding operation; and

at least one processor coupled to the storage medium to execute the programming instructions.

49. The apparatus of claim 48, wherein the programming instructions are further designed to enable the apparatus to determine whether the path is open, and if the path is determined to be open, further

determine a start and an end point of the path,

determine a first and a second point on a blank corresponding to the start and end points of the path,

determine faces of the blank that are incident on the first and second points,

select valid ones of said faces,

copy and extend the selected valid ones of said faces into bodies, and

unite said bodies, to form a trimmer body, where the trimmer body is used for the generation of the data representation of the fillet weld bead.

50. An apparatus comprises

storage medium having stored therein a plurality of programming instructions designed to enable the apparatus to

determine whether a path is open, where the path is generated based on a blank that is generated based on a plurality of faces of a plurality of components of an article of manufacture, the components to be fillet welded together at the faces when the article is manufactured outside the computing environment, and

if the path is determined to be open, further

determine a start and an end point of the path,

determine a first and a second point on a blank corresponding to the start and end points of the path,

determine faces of the blank that are incident on the first and second points,

select valid ones of said faces,

copy and extend the selected valid ones of said faces into bodies, and

unite said bodies, to form a trimmer body, where the trimmer body is used for generating a data representation of a fillet weld bead of the fillet welding operation; and

at least one processor coupled to the storage medium to execute the programming instructions.

51. The apparatus of claim 50, wherein the programming instructions are further designed to enable the apparatus to

transfer attributes from edges of the profile to lateral faces of the tool;

subtract a blank, created based at least in part on bodies referred to by the faces, from tool;

perform a selective boolean operation on the result of the subtraction and a trimmer body; and

initialize the result of the selective boolean operation as a data representation of the fillet weld bead.